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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/657,854	09/09/2003	Kenneth M. Martin	IMM050B	2113

7590 09/09/2005

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EXAMINER	
PIZIALI, JEFFREY J	

ART UNIT	PAPER NUMBER
2673	

DATE MAILED: 09/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/657,854	MARTIN ET AL.	
	Examiner	Art Unit	
	Jeff Piziali	2673	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) *10,20,29 and 30* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 September 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *09 September 2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The listing of references in the specification (see, for instance, Paragraphs 30, 35, and 63 in the Specification) is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference signs mentioned in the description: "59" (see Fig. 2 and Paragraph 32 in the Specification), "200" (see Fig. 6 and Paragraph 64 in the Specification), "204" (see Fig. 6 and Paragraph 68 in the Specification), and "356" (see Fig. 10 and Paragraph 86 in the Specification). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the

examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference characters not mentioned in the description: "105a" (see Figs. 3 & 5), "105b" (see Fig. 5), "107a" (see Fig. 3), "107b" (see Fig. 3), and "256" (see Fig. 7). Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The abstract of the disclosure is objected to because line 2 should be changed from "forces oil" to "forces on." Correction is required. See MPEP § 608.01(b).

5. The disclosure is objected to because of the following informalities:

Paragraphs 47 and 53 are each missing the full application details for a co-pending patent application.

The "point Mint" in Paragraph 78 should be changed to "point Min2."

The "raw sensor range arid" in Paragraph 85 should be changed to "raw sensor range and."

Appropriate correction is required.

6. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

7. Claim 10 is objected to because of the following informalities: the claim ends with a semicolon instead of a period. Appropriate correction is required.

8. Claim 20 is objected to because of the following informalities: "asjusting," in line 1, should be changed to "adjusting." Appropriate correction is required.

9. Claim 29 is objected to because of the following informalities: "claim 26 determining" (in line 1) should be changed to "claim 26 further comprising determining." Appropriate correction is required.

10. Claim 30 is objected to because of the following informalities: the claim ends with a comma instead of a period. Appropriate correction is required.

Claim Rejections - 35 USC § 112

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. Claims 23 and 27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

13. Claim 23 recites the limitation "the force feedback device" in line 2. There is insufficient antecedent basis for this limitation in the claim.

14. Claim 27 recites the limitation "the saturation levels at the ends of the linear function" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this

subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

16. Claims 1-3, 5-10, and 12-32 are rejected under 35 U.S.C. 102(e) as being anticipated by Delson et al (US 6,002,184 A).

Regarding claim 1, Delson discloses a method comprising: receiving a sensor signal comprising a raw sensor value from a sensor [Fig. 42; 4206], the raw sensor value associated with a position of a manipulandum [Fig. 42; 4208] in a range of motion; and outputting an output signal [Fig. 42; 4210, 4214, and 4216 operating in unison] comprising an adjusted raw sensor value, the adjusted raw sensor value associated with a compliance between the sensor and the manipulandum (see Column 43, Line 62 - Column 44, Line 17).

Regarding claim 2, Delson discloses the compliance is associated with a compliance constant [Fig. 42; 4200] and a current output force [Fig. 42; 4208] (see Column 43, Line 62 - Column 44, Line 17).

Regarding claim 3, Delson discloses determining a closed-loop position-dependent force [Fig. 42; 4212] based at least in part on the raw sensor value (see Column 43, Line 62 - Column 44, Line 17).

Regarding claim 5, Delson discloses filtering the raw sensor value for overshoot sensor values occurring at limits to the range of motion of the manipulandum (see Column 46, Lines 19-47).

Regarding claim 6, Delson discloses calibrating the range of motion of the manipulandum by adjusting minimum and maximum values of the range of motion based at least in part on the extent of motion of the manipulandum up to a designated time (see Column 46, Lines 19-47).

Regarding claim 7, Delson discloses normalizing the raw sensor value to a normalized range of motion, wherein the adjusted raw sensor value is further associated with the normalized raw sensor value (see Column 43, Lines 26-61).

Regarding claim 8, this claim is rejected by the reasoning applied in rejecting claim 1; furthermore, Delson discloses a device comprising: a linkage mechanism providing a degree of freedom to the manipulandum (see Column 2, Lines 52-59); and a processor (see Column 10, Lines 56-61).

Regarding claim 9, Delson discloses the linkage mechanism includes a chain of four rotatably-coupled members [Fig. 5A; 105 and 119] coupled to ground at each end of the chain (see Column 29, Lines 18-47).

Regarding claim 10, Delson discloses an actuator (see Column 1, Lines 5-12) coupled to the linkage mechanism, the actuator operative to output a force in the degree of freedom (see Column 2, Lines 52-59).

Regarding claim 12, Delson discloses the sensor comprises a relative digital encoder (see Column 35, Lines 48-54).

Regarding claim 13, Delson discloses the sensor is coupled to the actuator such that the sensor is operable to detect rotation of a shaft of the actuator (see Column 1, Lines 48-57).

Regarding claim 14, this claim is rejected by the reasoning applied in rejecting claim 6.

Regarding claim 15, this claim is rejected by the reasoning applied in rejecting claim 3.

Regarding claim 16, this claim is rejected by the reasoning applied in rejecting claim 1, 5, and 6; furthermore, Delson discloses the calibration is based at least in part on the filtered sensor value (see Column 43, Lines 5-257).

Regarding claim 17, this claim is rejected by the reasoning applied in rejecting claim 1.

Regarding claim 18, Delson discloses the filtering includes using a low pass filter (see Fig. 7) on the raw sensor value (see Column 32, Lines 49-67).

Regarding claim 19, Delson discloses the calibrating includes assigning an initial range with initial maximum and initial minimum values to the manipulandum (see Column 6, Lines 30-37).

Regarding claim 20, Delson discloses adjusting the minimum and maximum values to maintain the initial range between the minimum and maximum values until both the minimum and maximum values are detected outside the initial range (see Column 43, Lines 26-54).

Regarding claim 21, Delson discloses if the filtered sensor value is below the minimum value, further comprising: setting the minimum value to the filtered sensor value [Fig. 7; at $-\alpha_{MAX}$], and adjusting the maximum value [Fig. 7; at $+\alpha_{MAX}$] to maintain a constant range from the minimum value, unless the maximum value has previously been detected outside the initial range (see Column 32, Lines 49-67).

Regarding claim 22, Delson discloses if the filtered sensor value is above the maximum value [Fig. 7; at $+\alpha_{MAX}$], further comprising: setting a maximum value to the filtered sensor value; and adjusting the minimum value [Fig. 7; at $-\alpha_{MAX}$] to maintain a constant range from the maximum value, unless the minimum value has previously been detected outside the initial range (see Column 32, Lines 49-67).

Regarding claim 23, this claim is rejected by the reasoning applied in rejecting claim 1.

Regarding claim 24, this claim is rejected by the reasoning applied in rejecting claim 7.

Regarding claim 25, Delson discloses the normalizing includes providing a saturation zone [Fig.7; at I_{MAX}] at each limit of the normalized range, the saturation zone causing a raw sensor value over a saturation level provided at the ends of the normalized range of motion to be adjusted to the saturation level (see Fig. 7; Column 32, Lines 49-67).

Regarding claim 26, this claim is rejected by the reasoning applied in rejecting claims 1 and 7.

Regarding claim 27, Delson discloses the normalized raw sensor value is based at least in part on normalizing according to a normalizing function, the normalizing function being a linear function having the saturation levels at the ends of the linear function (see Column 37, Lines 45-67), wherein the normalizing function has a greater slope between the ends of the range of motion than a normalizing function without the saturation zones (see Fig. 7; Column 32, Lines 49-67).

Regarding claim 28, this claim is rejected by the reasoning applied in rejecting claim 1.

Regarding claim 29, this claim is rejected by the reasoning applied in rejecting claim 3.

Regarding claim 30, this claim is rejected by the reasoning applied in rejecting claim 3.

Regarding claim 31, Delson discloses the closed-loop condition force comprises one of a spring force, a damping force, and a texture force (see Column 42, Lines 38-47).

Regarding claim 32, this claim is rejected by the reasoning applied in rejecting claim 6.

Claim Rejections - 35 USC § 103

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

18. Claims 4 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Delson et al (US 6,002,184 A) in view of the instant application's admitted prior art.

Regarding claim 4, Delson does not expressly disclose using a belt drive. However, the instant application's admitted prior art does disclose transmitting forces from an actuator to a manipulandum with a belt drive (see Paragraph 5 in the Instant Specification). Delson and the instant application's admitted prior art are analogous art, because they are both from the shared field of force feedback interface device between humans and computers. Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention use the belt drive of the instant application's admitted prior art with Delson's raw sensor value adjustment method, so as provide a reduced cost transmission system having high fidelity motion and force output.

Regarding claim 11, this claim is rejected by the reasoning applied in rejecting claim 4.

19. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Conclusion

20. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Thorner et al (US 6,422,941 B1), Pelkey (US 6,078,311 A), Kramer et al (US 6,042,555 A), Pelkey (US 6,017,273 A), Osborne et al (US 6,005,551 A), Lander et al (US 5,984,880 A), Stewart et al (US 5,973,678 A), McIntosh (US 5,103,404 A), and Tsuchihashi et al (US 5,053,975 A) are cited to further evidence the state of the art pertaining to position sensing methods for interface devices.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff Piziali whose telephone number is (571) 272-7678. The examiner can normally be reached on Monday - Friday (6:30AM - 3PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bipin Shalwala can be reached on (571) 272-7681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

J.P.
2 September 2005

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